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Special Issue "Bridge Structural Health Monitoring and Damage Identification"

- Special Issue Editors

- Special Issue Information
- Keywords
- Published Papers

A special issue of *Sensors* (/journal/sensors) (ISSN 1424-8220). This special issue belongs to the section "Physical Sensors (/journal/sensors/sections/physicalsensors)".

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Special Issue Editors

Guest Editor

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Interests: Analisis Modal Operacion; Alalgoritmo EM

Special Issue Information

Dear Colleagues,

Bridge structural health monitoring (BSHM) has the potential to perform an essential role in monitoring aging bridges since it can identify early damage propagation, which may evolve into huge economic losses and catastrophic failures. Bridges, which involve complicated engineering, are frequently located in restricted areas, such as cliffs, rivers, and straits. For connecting two separated areas, various types of bridges have been developed and constructed, including long span suspension or cable-stayed bridges, and steel–concrete composite bridges. Regarding this situation, BSHM adopts various sensors, such as cameras, wireless sensors, and radar to better examine bridges from distinct perspectives. Hereinafter, non-conventional methodologies and techniques, such as data driven approaches, are investigated. However, the reliability and accuracy of BSHM is, to date, out of reach, since more sophisticated bridges are constructed, which requires further investigation and a deeper understanding of BSHM.

This Special Issue aims to explore BSHM via various sensing techniques and related approaches, especially those for real bridge applications. This shall include multidisciplinary studies, and, thus, welcomes investigations related to BSHM from mechanical engineering, civil engineering, numerical simulations, signal processing, and so on.

This Special Issue aims to publish high-quality investigations regarding BSHM and damage identification, as well as reviews summarizing advances over recent years. Original, high-quality contributions that are not published elsewhere are welcome for this Special Issue.

Potential topics include, but are not limited to, the following:

- Bridge structural health monitoring
- Damage identification including detection, localization and quantification methods
- Machine learning in BSHM
- Artificial intelligence BSHM
- Big data processing and management
- Advanced sensing systems in BSHM
- Robotic inspecting system in BSHM
- Embedded sensing system in BSHM
- Long-term condition monitoring for bridges

Papers are published upon acceptance, regardless of the Special Issue publication date.

Dr. Yun Lai Zhou
Dr. Magd Abdel Wahab
Dr. Eloi Figueiredo
Dr. Francisco Javier Cara Cañas
Guest Editors

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Submitted manuscripts should not have been published previously, nor be under consideration for publication elsewhere (except conference proceedings papers). All manuscripts are thoroughly refereed through a single-blind peer-review process. A guide for authors and other relevant information for submission of manuscripts is

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Keywords

- Bridge structural health monitoring
- Damage identification
- Machine learning
- Artificial intelligence
- Robotic inspection
- big data processing

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Research

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Open Access Article

Uniaxial Static Stress Estimation for Concrete Structures Using Digital Image Correlation (/1424-8220/19/2/319)

by Junhwa Lee (/search?authors=Junhwa%20Lee&orcid=),
Eun Jin Kim (/search?authors=Eun%20%20Jin%20Kim&orcid=),
Seongwoo Gwon (/search?authors=Seongwoo%20Gwon&orcid=0000-0002-3048-7265),
Soojin Cho (/search?authors=Soojin%20Cho&orcid=0000-0002-1824-9408) and
Sung-Han Sim (/search?authors=Sung-Han%20Sim&orcid=0000-0002-7737-1892)
Sensors **2019**, *19*(2), 319; https://doi.org/10.3390/s19020319 (https://doi.org/10.3390/s19020319)
Received: 28 November 2018 / Revised: 7 January 2019 / Accepted: 9 January 2019 / Published: 15 January 2019
PDF Full-text (/1424-8220/19/2/319/pdf) (4317 KB) | HTML Full-text (/1424-8220/19/2/319/htm) | XML Full-text (/1424-8220/19/2/319/xml)

Abstract This paper proposes a static stress estimation method for concrete structures, using the stress relaxation method (SRM) in conjunction with digital image correlation (DIC). The proposed method initially requires a small hole to be drilled in the concrete surface to induce stress relaxation [...] Read more.

(This article belongs to the Special Issue Bridge Structural Health Monitoring and Damage Identification (/journal/sensors/special_issues/Bridge))

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Open Access Article

Robotic System for Inspection by Contact of Bridge Beams Using UAVs (/1424-8220/19/2/305)

by Pedro J. Sanchez-Cuevas (/search?authors=Pedro%20%20J.%20Sanchez-Cuevas&orcid=),
Pablo Ramon-Soria (/search?authors=Pablo%20Ramon-Soria&orcid=0000-0002-1411-0281),
Begoña Arrue (/search?authors=Bego%C3%B1a%20Arrue&orcid=),
Anibal Ollero (/search?authors=Anibal%20Ollero&orcid=) and
Guillermo Heredia (/search?authors=Guillermo%20Heredia&orcid=)

Sensors **2019**, *19*(2), 305; https://doi.org/10.3390/s19020305 (https://doi.org/10.3390/s19020305)
Received: 30 November 2018 / Revised: 9 January 2019 / Accepted: 10 January 2019 / Published: 14 January 2019
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Abstract This paper presents a robotic system using Unmanned Aerial Vehicles (UAVs) for bridge-inspection tasks that require physical contact between the aerial platform and the bridge surfaces, such as beam-deflection analysis or measuring crack depth with an ultrasonic sensor. The proposed system takes advantage [...] Read more.

(This article belongs to the Special Issue Bridge Structural Health Monitoring and Damage Identification (/journal/sensors/special_issues/Bridge))

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Cable Interlayer Slip Damage Identification Based on the Derivatives of Eigenparameters (/1424-8220/18/12/4456)

by Jintu Zhong (/search?authors=Jintu%20Zhong&orcid=0000-0002-8950-0073), Quansheng Yan (/search?authors=Quansheng%20Yan&orcid=), Liu Mei (/search?authors=Liu%20Mei&orcid=0000-0002-5198-6506), Xijun Ye (/search?authors=Xijun%20Ye&orcid=0000-0001-7946-1245) and Jie Wu (/search?authors=Jie%20Wu&orcid=0000-0003-1069-9372)

Sensors **2018**, *18*(12), 4456; https://doi.org/10.3390/s18124456 (https://doi.org/10.3390/s18124456)
Received: 30 October 2018 / Revised: 13 December 2018 / Accepted: 13 December 2018 / Published: 16 December 2018

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Abstract Cables are the main load-bearing structural components of long-span bridges, such as suspension bridges and cable-stayed bridges. When relative slip occurs among the wires in a cable, the local bending stiffness of the cable will significantly decrease, and the cable enters a local [...] Read more.

(This article belongs to the Special Issue Bridge Structural Health Monitoring and Damage Identification (/journal/sensors/special_issues/Bridge))

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Damage Localization of Beam Bridges Using Quasi-Static Strain Influence Lines Based on the BOTDA Technique (/1424-8220/18/12/4446)

by Yang Liu (/search?authors=Yang%20Liu&orcid=0000-0002-1187-6388) and Shaoyi Zhang (/search?authors=Shaoyi%20Zhang&orcid=)

Sensors **2018**, *18*(12), 4446; https://doi.org/10.3390/s18124446 (https://doi.org/10.3390/s18124446)
Received: 14 November 2018 / Revised: 13 December 2018 / Accepted: 14 December 2018 / Published: 15 December 2018

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Abstract The diagnosis of damage in a bridge superstructure using quasi-static strain influence lines (ILs) is promising. However, it is challenging to accurately localize the damage in a bridge superstructure due to limited numbers of strain IL measurement points and inconsistencies between the loading [...] Read more.

(This article belongs to the Special Issue Bridge Structural Health Monitoring and Damage Identification (/journal/sensors/special_issues/Bridge))

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Drive-By Bridge Frequency Identification under Operational Roadway Speeds Employing Frequency Independent Underdamped Pinning Stochastic Resonance (FI-UPSR) (/1424-8220/18/12/4207)

by Ahmed Elhattab (/search?authors=Ahmed%20Elhattab&orcid=0000-0002-0154-5550), Nasim Uddin (/search?authors=Nasim%20Uddin&orcid=) and Eugene OBrien (/search?authors=Eugene%20OBrien&orcid=0000-0002-6867-1009)

Sensors **2018**, *18*(12), 4207; https://doi.org/10.3390/s18124207 (https://doi.org/10.3390/s18124207)
Received: 2 November 2018 / Revised: 22 November 2018 / Accepted: 24 November 2018 / Published: 30 November 2018

Abstract Recently, drive-by bridge inspection has attracted increasing attention in the bridge monitoring field. A number of studies have given confidence in the feasibility of the approach to detect, quantify, and localize damages. However, the speed of the inspection truck represents a major obstacle [...] Read more.

(This article belongs to the Special Issue Bridge Structural Health Monitoring and Damage Identification (/journal/sensors/special_issues/Bridge))

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Open Access Article

Model Updating for Nam O Bridge Using Particle Swarm Optimization Algorithm and Genetic Algorithm (/1424-8220/18/12/4131)

by H. Tran-Ngoc (/search?authors=H.%20Tran-Ngoc&orcid=), S. Khatir (/search?authors=S.%20Khatir&orcid=), G. De Roeck (/search?authors=G.%20De%20Roeck&orcid=), T. Bui-Tien (/search?authors=T.%20Bui-Tien&orcid=), L. Nguyen-Ngoc (/search?authors=L.%20Nguyen-Ngoc&orcid=) and M. Abdel Wahab (/search?authors=M.%20Abdel%20Wahab&orcid=)

Sensors **2018**, *18*(12), 4131; https://doi.org/10.3390/s18124131 (https://doi.org/10.3390/s18124131)
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PDF Full-text (/1424-8220/18/12/4131/pdf) (6652 KB) | HTML Full-text (/1424-8220/18/12/4131/htm) | XML Full-text (/1424-8220/18/12/4131/xml)

Abstract Vibration-based structural health monitoring (SHM) for long-span bridges has become a dominant research topic in recent years. The Nam O Railway Bridge is a large-scale steel truss bridge located on the unique main rail track from the north to the south of Vietnam. [...] Read more.

(This article belongs to the Special Issue Bridge Structural Health Monitoring and Damage Identification (/journal/sensors/special_issues/Bridge))

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Open Access Article

An Integrated Machine Learning Algorithm for Separating the Long-Term Deflection Data of Prestressed Concrete Bridges (/1424-8220/18/11/4070)

by Xijun Ye (/search?authors=Xijun%20Ye&orcid=0000-0001-7946-1245), Xueshuai Chen (/search?authors=Xueshuai%20Chen&orcid=), Yaxiong Lei (/search?authors=Yaxiong%20Lei&orcid=), Jiangchao Fan (/search?authors=Jiangchao%20Fan&orcid=) and Liu Mei (/search?authors=Liu%20Mei&orcid=0000-0002-5198-6506)

Sensors **2018**, *18*(11), 4070; https://doi.org/10.3390/s18114070 (https://doi.org/10.3390/s18114070)
Received: 29 October 2018 / Revised: 15 November 2018 / Accepted: 16 November 2018 / Published: 21 November 2018

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Abstract Deflection is one of the key indexes for the safety evaluation of bridge structures. In reality, due to the changing operational and environmental conditions, the deflection signals measured by structural health monitoring systems are greatly affected. These ambient changes in the system often [...] Read more.

(This article belongs to the Special Issue Bridge Structural Health Monitoring and Damage Identification (/journal/sensors/special_issues/Bridge))

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Open Access Article

Probabilistic Damage Detection of a Steel Truss Bridge Model by Optimally Designed Bayesian Neural Network (/1424-8220/18/10/3371)

by Tao Yin (/search?authors=Tao%20Yin&orcid=) and Hong-ping Zhu (/search?authors=Hong-ping%20Zhu&orcid=)

Sensors **2018**, *18*(10), 3371; https://doi.org/10.3390/s18103371 (https://doi.org/10.3390/s18103371)
Received: 12 September 2018 / Revised: 3 October 2018 / Accepted: 6 October 2018 / Published: 9 October 2018
PDF Full-text (/1424-8220/18/10/3371/pdf) (2072 KB) | HTML Full-text (/1424-8220/18/10/3371/htm) | XML Full-text (/1424-8220/18/10/3371/xml)

Abstract Excellent pattern matching capability makes artificial neural networks (ANNs) a very promising approach for vibration-based structural health monitoring (SHM). The proper design of the network architecture with the suitable complexity is vital to the ANN-based structural damage detection. In addition to the number [...] Read more.

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Performance of Rayleigh-Based Distributed Optical Fiber Sensors Bonded to Reinforcing Bars in Bending (/1424-8220/18/9/3125)

by Mattia Francesco Bado (/search?authors=Mattia%20Francesco%20Bado&orcid=0000-0003-3446-261X), Joan Ramon Casas (/search?authors=Joan%20Ramon%20Casas&orcid=0000-0003-4473-4308) and António Barrias (/search?authors=Ant%C3%B3nio%20Barrias&orcid=0000-0002-2298-7956)

Sensors **2018**, *18*(9), 3125; https://doi.org/10.3390/s18093125 (https://doi.org/10.3390/s18093125)
Received: 16 August 2018 / Revised: 5 September 2018 / Accepted: 12 September 2018 / Published: 16 September 2018

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Abstract Distributed Optical Fiber Sensors (DOFSs), thanks to their multiple sensing points, are ideal tools for the detection of deformations and cracking in reinforced concrete (RC) structures, crucial as a means to ensure the safety of infrastructures. Yet, beyond a certain point of most [...] Read more.

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Damage Detection in Active Suspension Bridges: An Experimental Investigation (/1424-8220/18/9/3002)

by Fanhao Meng (/search?authors=Fanhao%20Meng&orcid=0000-0002-7798-738X), Bilal Mokrani (/search?authors=Bilal%20Mokrani&orcid=0000-0002-4174-0051), David Alaluf (/search?authors=David%20Alaluf&orcid=), Jingjun Yu (/search?authors=Jingjun%20Yu&orcid=) and André Preumont (/search?authors=Andr%C3%A9%20Preumont&orcid=)

Sensors **2018**, *18*(9), 3002; https://doi.org/10.3390/s18093002 (https://doi.org/10.3390/s18093002)
Received: 8 August 2018 / Revised: 2 September 2018 / Accepted: 4 September 2018 / Published: 7 September 2018

PDF Full-text (/1424-8220/18/9/3002/pdf) (5333 KB) | HTML Full-text (/1424-8220/18/9/3002/htm) | XML Full-text (/1424-8220/18/9/3002/xml)

Abstract This paper considers a Hilbert marginal spectrum-based approach to health monitoring of active suspension bridge hangers. The paper proposes to takes advantage of the presence of active cables and use them as an excitation mean of the bridge, while they are used for [...] Read more.

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Effects of the Ground Resolution and Thresholding on Crack Width Measurements (/1424-8220/18/8/2644)

by Hyunwoo Cho (/search?authors=Hyunwoo%20Cho&orcid=0000-0002-5822-5865), Hyuk-Jin Yoon (/search?authors=Hyuk-Jin%20Yoon&orcid=) and Ju-Yeong Jung (/search?authors=Ju-Yeong%20Jung&orcid=)

Sensors **2018**, *18*(8), 2644; https://doi.org/10.3390/s18082644 (https://doi.org/10.3390/s18082644)
Received: 19 June 2018 / Revised: 29 July 2018 / Accepted: 9 August 2018 / Published: 12 August 2018

PDF Full-text (/1424-8220/18/8/2644/pdf) (4803 KB) | HTML Full-text (/1424-8220/18/8/2644/htm) | XML Full-text (/1424-8220/18/8/2644/xml)

Abstract When diagnosing the condition of a structure, it is necessary to measure the widths of any existing cracks in the structure. To ensure safety when relying on images of cracks, the selected imaging parameters and processing technology must be well understood. In this [...] Read more.

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Improved ABC Algorithm Optimizing the Bridge Sensor Placement (/1424-8220/18/7/2240)

by Jianhui Yang (/search?authors=Jianhui%20Yang&orcid=0000-0002-8247-9435) and Zhenrui Peng (/search?authors=Zhenrui%20Peng&orcid=)

Sensors **2018**, *18*(7), 2240; https://doi.org/10.3390/s18072240 (https://doi.org/10.3390/s18072240)

Received: 29 May 2018 / Revised: 5 July 2018 / Accepted: 6 July 2018 / Published: 11 July 2018

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Abstract Inspired by sensor coverage density and matching & preserving strategy, this paper proposes an Improved Artificial Bee Colony (IABC) algorithm which is designed to optimize bridge sensor placement. We use dynamic random coverage coding method to initialize colony to ensure the diversity and [...] Read more.

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Sensitivity Analysis of Geometrical Parameters on the Aerodynamic Performance of Closed-Box Girder Bridges (/1424-8220/18/7/2053)

by Yongxin Yang (/search?authors=Yongxin%20Yang&orcid=), Rui Zhou (/search?authors=Rui%20Zhou&orcid=0000-0002-9167-403X), Yaojun Ge (/search?authors=Yaojun%20Ge&orcid=), Yanliang Du (/search?authors=Yanliang%20Du&orcid=) and Lihai Zhang (/search?authors=Lihai%20Zhang&orcid=)

Sensors **2018**, *18*(7), 2053; https://doi.org/10.3390/s18072053 (https://doi.org/10.3390/s18072053)

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PDF Full-text (/1424-8220/18/7/2053/pdf) (5292 KB) | HTML Full-text (/1424-8220/18/7/2053/htm) | XML Full-text (/1424-8220/18/7/2053/xml)

Abstract In this study, the influence of two critical geometrical parameters (i.e., angles of wind fairing, α; and lower inclined web, β) in the aerodynamic performance of closed-box girder bridges was systematically investigated through conducting a theoretical analysis and wind tunnel testing using laser [...] Read more.

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Dynamic Model Updating for Bridge Structures Using the Kriging Model and PSO Algorithm Ensemble with Higher Vibration Modes (/1424-8220/18/6/1879)

by Shiqiang Qin (/search?authors=Shiqiang%20Qin&orcid=),
Yazhou Zhang (/search?authors=Yazhou%20Zhang&orcid=0000-0002-9065-5232),
Yun-Lai Zhou (/search?authors=Yun-Lai%20Zhou&orcid=0000-0002-2347-647X) and
Juntao Kang (/search?authors=Juntao%20Kang&orcid=)

Sensors **2018**, *18*(6), 1879; https://doi.org/10.3390/s18061879 (https://doi.org/10.3390/s18061879)
Received: 28 May 2018 / Revised: 4 June 2018 / Accepted: 6 June 2018 / Published: 8 June 2018
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Abstract This study applied the kriging model and particle swarm optimization (PSO) algorithm for the dynamic model updating of bridge structures using the higher vibration modes under large-amplitude initial conditions. After addressing the higher mode identification theory using time-domain operational modal analysis, the kriging [...] Read more.

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Sensors **2019**, *19*(3), 463; https://doi.org/10.3390/s19030463 (https://doi.org/10.3390/s19030463)
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